12271

# PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

## PCT

### NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

| | |
|---|---|
| **Date of mailing** (day/month/year)<br>25 May 2001 (25.05.01) | |
| **International application No.**<br>PCT/GB00/03574 | **Applicant's or agent's file reference**<br>NG/ARB/19729 |
| **International filing date** (day/month/year)<br>18 September 2000 (18.09.00) | **Priority date** (day/month/year)<br>16 September 1999 (16.09.99) |
| **Applicant**<br>MCGARIAN, Bruce | |

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   06 April 2001 (06.04.01)

   [ ] in a notice effecting later election filed with the International Bureau on:

   _____

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

**The International Bureau of WIPO**
**34, chemin des Colombettes**
**1211 Geneva 20, Switzerland**

Facsimile No.: (41-22) 740.14.35

Authorized officer

Zakaria EL KHODARY

Telephone No.: (41-22) 338.83.38

# PATENT COOPERATION TREATY

# PCT



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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| NG/ARB/19729 | | |
| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
| PCT/GB00/03574 | 18/09/2000 | 16/09/1999 |
| International Patent Classification (IPC) or national classification and IPC<br>E21B7/06 | | |
| Applicant<br>SMITH INTERNATIONAL, INC. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☒ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 06/04/2001 | 27.11.2001 |
| Name and mailing address of the international preliminary examining authority:<br>European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Authorized officer<br>Str mmen, H<br>Telephone No. +49 89 2399 7345 |

Form PCT/IPEA/409 (cover sheet) (January 1994)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03574

## I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
**Description, pages:**

| | | | | |
|---|---|---|---|---|
| 1-10 | as originally filed | | | |

**Claims, No.:**

| | | | | |
|---|---|---|---|---|
| 1-4 | as received on | 08/11/2001 | with letter of | 06/11/2001 |

**Drawings, sheets:**

| | |
|---|---|
| 1/16-16/16 | as originally filed |

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 1-4 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | |
| | No: | Claims | 1-4 |
| Industrial applicability (IA) | Yes: | Claims | 1-4 |
| | No: | Claims | |

2. Citations and explanations
**see separate sheet**

## VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

**see separate sheet**

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
**see separate sheet**

## VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
**see separate sheet**

Reference is made to the following documents:

D1: US-A-5 615 740
D2: US-A-6 012 516
D3: CA-A-2 236 047
D4: US-A-5 704 437

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

V-1 D1 which is considered the closest prior art discloses, as far as claim 1 can be understood (this goes in particular for the last 4 lines of said claim, see section VIII-1), the subject-matter of claim 1 as follows (the references in parentheses applying to this document):

A downhole system (fig. 8, W) for locating equipment at required depth and orientation within a well bore (col. 4, l. 15-17), the system comprising a portion of wellbore casing (10) having an inner surface in which a latch profile is defined (col. 6, l. 22-23); and downhole apparatus (102, 100) comprising a latch sub (100) for locating equipment (102) secured thereto at a required depth and orientation, the latch sub (100) comprising a body (housing of item 100) and a latching member (106) mounted on said body (housing of item 100) so as to be movable between a retracted position and an extended position (col. 6, l. 24-25), the latching member (106) projecting a greater radial distance from said body (housing of item 100) when in the extended position than when in the retracted position (fig. 12-14), wherein the latching member (106) is adapted to project into a latch profile (105) provided in said portion of wellbore casing (10) when in the extended position during use (col. 6, l. 25-29), and wherein a first portion (the first recess portion) of said latch profile (105) is adapted to be engaged by the latching member in such a way that, when pressed against said profile portion (105), the latching member (106) tends to slide along a well bore casing edge defining said profile portion so as to locate the latching member (106) in abutment with a further profile portion (the deepest part of recess

105) and thereby prevent further movement of the latch sub in the direction of pressing, the latching member (106) being further adapted to engage a portion of said profile (fig. 11) in such a way that, when pressed against said profile portion (105), the latching member (106) is moved towards the retracted position so as to permit movement of the downhole apparatus (100) past said latch profile (col. 7, l. 62-66).

The apparatus according to claim 1, therefore differs with respect to D1 in that an anchor packer is secured to said latch sub for releasably fixing the depth and orientation of said latch sub relative to a wellbore.

The apparatus according to claim 1 is therefore new and the claim meets the novelty requirements of Article 33(2) PCT.

V-2 The distinguishing feature of claim 1 is related to the problem of how to further ensure that the position of the device located axially and rotationally in the casing is maintained.

For initiating the drilling of deviated wells, D4 also teaches that a tool among other also comprising a whipstock should be located by means of a locating and orientation system (see for instance fig. 2) and that such a tool should additionally be secured by means of a packer system (col. 3, l. 51-52).

The skilled man would therefore obviously include such a packer into the system of D1 in order to solve the problem resulting in claim 1 not being inventive contrary to the requirement of Article 33(3) PCT.

V-3 The features of dependent claims 2 and 3 merely represent straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed. Said claims do therefore not involve an inventive step (Article 33(3) PCT).

V-4 Independent method claim 3 relates effectively to the same subject-matter as claim 1. For analogous reasons, said claim does therefore also not

involve an inventive step. (Article 33(3) PCT).

V-5 The applicant is made aware of the fact that the text of D2 also seems to disclose a number of features of the claims even though D2 is not part of the prior art, see section VI. D3 however, which is a family document to D2 and which can be expected to disclose similar or identical subject-matter, is part of the prior art as defined in Rule 64.1 PCT. D3 could not, at the present time, be retrieved.

## Re Item VI
## Certain documents cited

VI-1 Certain published documents (Rule 70.10)

| Document No.: | Publication date: | Filing date: | Priority date: |
|---|---|---|---|
| US-A-6 012 516 | 11.01.2000 | 05.09.1997 | - |

D2 was filed before the filing date of the present application but published after said date, whereby the document is not part of the prior art as defined in Rule 64.1 PCT. The attention of the applicant is however drawn to the fact that said document or a document corresponding to it, could be considered as part of the prior art, at least as far as novelty is concerned, in a possible national or regional phase.

## Re Item VII
## Certain defects in the international application

VII-1 The independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from D1 being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

VII-2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

VII-3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1 and D4 is not mentioned in the description, nor are these documents identified therein.

**Re Item VIII**

**Certain observations on the international application**

VIII-1 The features of claim 1 which are specified in the last four lines of said claim are not referred to in the description. Claim 1 is therefore not supported by the description as required by Article 6 PCT.

VIII-2 It seems clear from the description that at least the feature of using shear pins is essential to the definition of the invention. Since none of the independent claims contain this feature it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

# ATENT COOPERATION TREAT

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| Applicant's or agent's file reference | **FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. | |
|---|---|---|
| NG/ARB/19729 | | |
| International application No. | International filing date *(day/month/year)* | (Earliest) Priority Date *(day/month/year)* |
| PCT/GB 00/ 03574 | 18/09/2000 | 16/09/1999 |
| Applicant | | |
| SMITH INTERNATIONAL, INC. | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[ ] the text is approved as submitted by the applicant.

[X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

[X] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

[ ] None of the figures.

**Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)**

Downhole apparatus for locating equipment in a required depth and orientation within a well bore, the apparatus comprising a body and a latching member mounted on said body so as to be movable between a retracted position and an extended position, wherein the latching member is adapted to protect into a latch profile provided in a casing of a well bore when in the extended position in such a way that it tends to slide along a well bore casing profile portion so as to locate the latching member centrally before preventing movement of the dowhole apparatus in the direction of pressing, the latching member being yet further adapted to engage a second portion of said profile in such a way that, when pressed against it, the latching member is moved towards the retracted position so as to permit movement of the downhole apparatus past said latch profile.

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/03574

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E21B7/06 E21B23/00 E21B23/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 5 615 740 A (COMEAU LAURIER E ET AL)<br>1 April 1997 (1997-04-01)<br>column 6, line 22 - line 50<br>column 8, line 16 - line 41<br>--- | 1-3 |
| P,X | US 6 012 516 A (BRUNET CHARLES G)<br>11 January 2000 (2000-01-11)<br>column 4, line 43 - line 61<br>column 6, line 65 -column 7, line 46<br>--- | 1,2 |
| X | & CA 2 236 047 A (BEGGS STEVEN; GEORGE GRANT E (CA)) 5 March 1999 (1999-03-05)<br>--- | 1,2 |
| A | US 5 704 437 A (MURRAY JAMES W)<br>6 January 1998 (1998-01-06)<br>column 8, line 11 - line 40<br>column 8, line 63 -column 9, line 8<br>---<br>-/-- | 1-3 |

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 17 January 2001 | 25/01/2001 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Garrido Garcia, M |

1

Form PCT/ISA/210 (second sheet) (July 1992)

# PATENT COOPERATION TREATY



PCT

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

GOODENOUGH, Nigel
A.A. THORNTON & CO.
235 High Holborn
London WC1V 7LE
GRANDE BRETAGNE

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

| | |
|---|---|
| Date of mailing *(day/month/year)* | 27.11.2001 |
| Applicant's or agent's file reference<br>NG/ARB/19729 | **IMPORTANT NOTIFICATION** |

| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
|---|---|---|
| PCT/GB00/03574 | 18/09/2000 | 16/09/1999 |

Applicant
SMITH INTERNATIONAL, INC.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

| Name and mailing address of the IPEA/ | Authorized officer |
|---|---|
| European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Goenechea Olmos, A<br><br>Tel.+49 89 2399-2664 |

Form PCT/IPEA/416 (July 1992)

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| NG/ARB/19729 | | |
| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
| PCT/GB00/03574 | 18/09/2000 | 16/09/1999 |
| International Patent Classification (IPC) or national classification and IPC<br>E21B7/06 | | |
| Applicant<br>SMITH INTERNATIONAL, INC. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

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3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☒ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 06/04/2001 | 27.11.2001 |
| Name and mailing address of the international preliminary examining authority:<br>European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Authorized officer<br>Str mmen, H<br>Telephone No. +49 89 2399 7345 |

Form PCT/IPEA/409 (cover sheet) (January 1994)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03574

## I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
**Description, pages:**

| | | | | |
|---|---|---|---|---|
| 1-10 | as originally filed | | | |

**Claims, No.:**

| | | | | |
|---|---|---|---|---|
| 1-4 | as received on | 08/11/2001 | with letter of | 06/11/2001 |

**Drawings, sheets:**

| | |
|---|---|
| 1/16-16/16 | as originally filed |

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
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3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
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4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 1-4 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | |
| | No: | Claims | 1-4 |
| Industrial applicability (IA) | Yes: | Claims | 1-4 |
| | No: | Claims | |

2. Citations and explanations
**see separate sheet**

## VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

**see separate sheet**

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
**see separate sheet**

## VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
**see separate sheet**

**INTERNATIONAL PRELIMINARY EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03574

Reference is made to the following documents:

D1: US-A-5 615 740
D2: US-A-6 012 516
D3: CA-A-2 236 047
D4: US-A-5 704 437

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

V-1 D1 which is considered the closest prior art discloses, as far as claim 1 can be understood (this goes in particular for the last 4 lines of said claim, see section VIII-1), the subject-matter of claim 1 as follows (the references in parentheses applying to this document):

A downhole system (fig. 8, W) for locating equipment at required depth and orientation within a well bore (col. 4, l. 15-17), the system comprising a portion of wellbore casing (10) having an inner surface in which a latch profile is defined (col. 6, l. 22-23); and downhole apparatus (102, 100) comprising a latch sub (100) for locating equipment (102) secured thereto at a required depth and orientation, the latch sub (100) comprising a body (housing of item 100) and a latching member (106) mounted on said body (housing of item 100) so as to be movable between a retracted position and an extended position (col. 6, l. 24-25), the latching member (106) projecting a greater radial distance from said body (housing of item 100) when in the extended position than when in the retracted position (fig. 12-14), wherein the latching member (106) is adapted to project into a latch profile (105) provided in said portion of wellbore casing (10) when in the extended position during use (col. 6, l. 25-29), and wherein a first portion (the first recess portion) of said latch profile (105) is adapted to be engaged by the latching member in such a way that, when pressed against said profile portion (105), the latching member (106) tends to slide along a well bore casing edge defining said profile portion so as to locate the latching member (106) in abutment with a further profile portion (the deepest part of recess

105) and thereby prevent further movement of the latch sub in the direction of pressing, the latching member (106) being further adapted to engage a portion of said profile (fig. 11) in such a way that, when pressed against said profile portion (105), the latching member (106) is moved towards the retracted position so as to permit movement of the downhole apparatus (100) past said latch profile (col. 7, l. 62-66).

The apparatus according to claim 1, therefore differs with respect to D1 in that an anchor packer is secured to said latch sub for releasably fixing the depth and orientation of said latch sub relative to a wellbore.

The apparatus according to claim 1 is therefore new and the claim meets the novelty requirements of Article 33(2) PCT.

V-2 The distinguishing feature of claim 1 is related to the problem of how to further ensure that the position of the device located axially and rotationally in the casing is maintained.

For initiating the drilling of deviated wells, D4 also teaches that a tool among other also comprising a whipstock should be located by means of a locating and orientation system (see for instance fig. 2) and that such a tool should additionally be secured by means of a packer system (col. 3, l. 51-52).

The skilled man would therefore obviously include such a packer into the system of D1 in order to solve the problem resulting in claim 1 not being inventive contrary to the requirement of Article 33(3) PCT.

V-3 The features of dependent claims 2 and 3 merely represent straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed. Said claims do therefore not involve an inventive step (Article 33(3) PCT).

V-4 Independent method claim 3 relates effectively to the same subject-matter as claim 1. For analogous reasons, said claim does therefore also not

involve an inventive step. (Article 33(3) PCT).

V-5 The applicant is made aware of the fact that the text of D2 also seems to disclose a number of features of the claims even though D2 is not part of the prior art, see section VI. D3 however, which is a family document to D2 and which can be expected to disclose similar or identical subject-matter, is part of the prior art as defined in Rule 64.1 PCT. D3 could not, at the present time, be retrieved.

## Re Item VI
## Certain documents cited

VI-1 Certain published documents (Rule 70.10)

| Document No.: | Publication date: | Filing date: | Priority date: |
|---|---|---|---|
| US-A-6 012 516 | 11.01.2000 | 05.09.1997 | - |

D2 was filed before the filing date of the present application but published after said date, whereby the document is not part of the prior art as defined in Rule 64.1 PCT. The attention of the applicant is however drawn to the fact that said document or a document corresponding to it, could be considered as part of the prior art, at least as far as novelty is concerned, in a possible national or regional phase.

## Re Item VII
## Certain defects in the international application

VII-1 The independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from D1 being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

VII-2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

VII-3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1 and D4 is not mentioned in the description, nor are these documents identified therein.

**Re Item VIII**

**Certain observations on the international application**

VIII-1 The features of claim 1 which are specified in the last four lines of said claim are not referred to in the description. Claim 1 is therefore not supported by the description as required by Article 6 PCT.

VIII-2 It seems clear from the description that at least the feature of using shear pins is essential to the definition of the invention. Since none of the independent claims contain this feature it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

10/070990
GB0003574
JC13 Rec'd PCT/PTO 14 MAR 2002



CLAIMS:

1. A downhole system for locating and fixing equipment at required depth and orientation within a wellbore, the system comprising a portion of well bore casing having an inner surface in which a latch profile is defined; and downhole apparatus comprising a latch sub for locating equipment secured thereto at a required depth and orientation, and an anchor packer secured to said latch sub for releasably fixing the depth and orientation of said latch sub relative to a well bore, the latch sub comprising a body and a latching member mounted on said body so as to be movable between a retracted position and an extended position, the latching member projecting a greater radical distance from said body when in the extended position than when in the retracted position, wherein the latching member is adapted to project into said latch profile provided in said portion of well bore casing when in the extended position during use and wherein a first portion of said latch profile is adapted to be engaged by the latching member in such a way that, when pressed against said profile portion, the latching member tends to slide along a well bore casing edge defining said profile portion so as to locate the latching member in abutment with a further profile portion and thereby prevent further movement of the latch sub in the direction of pressing, the latching member being further adapted to engage a portion of said profile in such a way that, when pressed against said profile portion, the latching member is moved towards the retracted position so as to permit movement of the downhole apparatus past said latch profile.

2. A downhole system as claimed in claim 1, wherein a downhole portion of said latch profile is of a V-shape.

3. A downhole system as claimed in claim 1 or 2, wherein said anchor packer is a weight set anchor packer.

4. A method of positioning downhole equipment within a well bore, the method comprising the steps of providing a latch profile in the wall of the well bore or well bore casing; determining the position and orientation of said latch profile;

making up a string comprising an anchor packer and equipment to be positioned within the well bore, said equipment being fixed relative to a latch member for locating in said latch profile and said equipment being positioned and orientated relative to the latch member in view of said determination so as to ensure a desired position and orientation of said equipment is achieved in the well bore when the latch member is located in said latch profile; running the string downhole; locating the latch member in said latch profile; sliding the latch member along an edge of said latch profile until a portion of said latch profile stops said sliding movement; and setting said anchor packer.

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/03574

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E21B7/06 E21B23/00 E21B23/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 5 615 740 A (COMEAU LAURIER E ET AL)<br>1 April 1997 (1997-04-01)<br>column 6, line 22 - line 50<br>column 8, line 16 - line 41 | 1-3 |
| P,X | US 6 012 516 A (BRUNET CHARLES G)<br>11 January 2000 (2000-01-11)<br>column 4, line 43 - line 61<br>column 6, line 65 -column 7, line 46 | 1,2 |
| X | & CA 2 236 047 A (BEGGS STEVEN; GEORGE GRANT E (CA)) 5 March 1999 (1999-03-05) | 1,2 |
| A | US 5 704 437 A (MURRAY JAMES W)<br>6 January 1998 (1998-01-06)<br>column 8, line 11 - line 40<br>column 8, line 63 -column 9, line 8 | 1-3 |

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 17 January 2001 | 25/01/2001 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Garrido Garcia, M |

Form PCT/ISA/210 (second sheet) (July 1992)

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/03574

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| P,A | US 6 089 319 A (SINGLETON TEME F)<br>18 July 2000 (2000-07-18)<br>column 6, line 18 - line 47 | 1-3 |

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

# INTERNATIONAL SEARCH REPORT

...ormation on patent family members

International Application No
PCT/GB 00/03574

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 5615740 A | 01-04-1997 | AU 699686 B | 10-12-1998 |
| | | AU 5626796 A | 09-01-1997 |
| | | CA 2180047 A | 30-12-1996 |
| | | GB 2302702 A,B | 29-01-1997 |
| | | NO 962765 A | 30-12-1996 |
| US 6012516 A | 11-01-2000 | CA 2236047 A | 05-03-1999 |
| US 5704437 A | 06-01-1998 | US 6003621 A | 21-12-1999 |
| US 6089319 A | 18-07-2000 | AU 3044999 A | 18-10-1999 |
| | | WO 9949178 A | 30-09-1999 |

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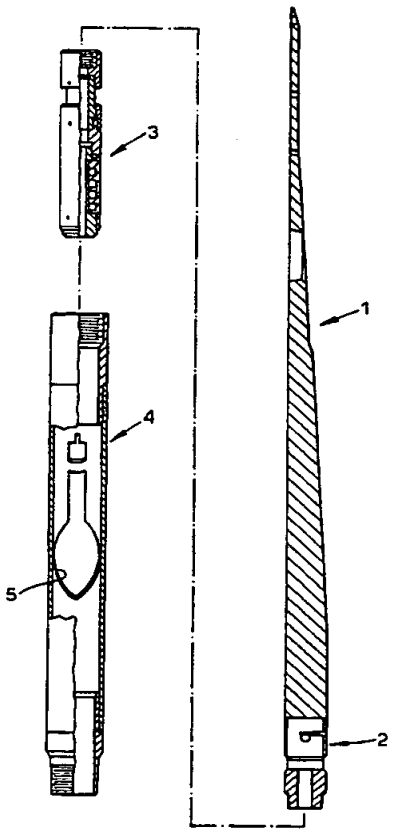
*[Continued on next page]*

(54) Title: DOWNHOLE LATCH ASSEMBLY AND METHOD OF USING THE SAME




(57) Abstract: Downhole apparatus for locating equipment in a required depth and orientation within a well bore, the apparatus comprising a body and a latching member mounted on said body so as to be movable between a retracted position and an extended position, wherein the latching member is adapted to project into a latch profile provided in a casing of a well bore when in the extended position in such a way that it tends to slide along a well bore casing profile portion so as to locate the latching member centrally before preventing movement of the downhole apparatus in the direction of pressing, the latching member being yet further adapted to engage a second portion of said profile in such a way that, when pressed against it, the latching member is moved towards the retracted position so as to permit movement of the downhole apparatus past said latch profile.

WO 01/20118 A1

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# DOWNHOLE LATCH ASSEMBLY AND METHOD OF USING THE SAME

The present invention relates to a method and apparatus for use in downhole oil and gas drilling operations and, particularly, but not exclusively, to a method and apparatus for locating downhole equipment in a required orientation and at a required depth within a borehole.

Embodiments of the present invention will now be described with reference to the accompanying drawings, in which:

FIGURE 1 shows an assembly of a whipstock 1, hinge connector 2 and latch 3 for running into a well bore casing provided with a latch coupling 4 provided with a latch profile 5, wherein the assembly is in accordance with the present invention;

FIGURE 2 shows a partial cross-section view of a well bore casing 6 provided with a latch coupling 4;

FIGURE 3 shows the assembly of Figure 1 being rung into the well bore casing 6 of Figure 2;

FIGURE 4 shows the latch 3 having being tripped within the well bore casing 6;

FIGURE 5 shows the assembly having being pulled up-hole so that the latch 3 is biased into the latch profile 5 so as to prevent further up-hole movement of the assembly and thereby position the assembly at a required depth and orientation;

FIGURE 6 shows a subsequent lateral bore hole drilling operation with the

whipstock 1 having being correctly positioned by virtue of the latch 3 locating in the latch profile 5;

FIGURE 7 is a cross-section view of a hydraulically set retrievable whipstock packer for use in conjunction with a latch, wherein slips 12 of the packer are located up-hole of the packer element J;

FIGURES 8, 9 and 10 show details A, B and C of Figure 7;

FIGURE 11 shows schematically the packer of Figure 7 arranged with the whipstock 1, hinge connector 2 and latch 3 shown in Figure 1;

FIGURE 12 shows schematically the whipstock 1 and hinge connector 2 of Figure 1 connected to an integral packer/latch assembly, wherein the packer element is located up-hole of the slips;

FIGURE 13 shows a cross-sectional view of a mechanically settable integral packer/latch assembly for use in the arrangement shown in Figure 12;

FIGURES 14-17 show the integral packer/latch assembly of Figure 13 being run in hole and latching into a latch profile;

FIGURE 18 shows a cross-sectional view of a hydraulically settable integral packer/latch assembly for use in the arrangement shown in Figure 12; and

FIGURES 19-22 show the integral packer/latch assembly of Figure 13 being run in hole and latching into a latch profile.

The apparatus of the present invention was originally devised for the second lateral leg in a seven leg multilateral well where leg one has been drilled out of the shoe, and where the latch coupling (provided with a latch profile for receiving a latch) will form a reference point in the liner/casing. It is proposed that 7" liner is run and suspended off bottom in 8½" hole with the lower end cemented around the shoe. Close to the bottom of the liner a 7" latch coupling is installed, if necessary with a biased edge for re-entry purposes. The plan is to use the latch and coupling in conjunction with a hydraulic (or mechanical) set retrievable packer to isolate the lower bore from losses. In this application of the system, trials of entry and re-entry of the latch into the latch profile will be performed.

Once the liner has been run and set with the first leg drilled, it will be

necessary to jet the profile in the latch coupling clean. It is proposed the jetting operation will be combined with a survey run which would eliminate the need to run our hydraulic swivel allowing us to independently orientate the whip relative to the coupling orientation. (If the latch did not have any orientation profile, we could use the hydraulic swivel). To enable this test, we plan to attempt to latch into the profile before jetting to determine the criticality of the operation, and then to disengage, jet the profile clean, re-engage, survey and come out of hole. In the event that we engage, it may not be necessary to jet the profile, however this should be done as a matter of course and due consideration given to whether it is safe to eliminate the jet run. Should more than one latch coupling be installed, surveys can be taken consecutively as the string is pulled out of hole. Note that all the coupling profiles are identical and the same latch assembly can be used for this purpose.

The proposed bottom hole assembly for this phase of the operation would be:

Orienting Latch Assembly
ACC Tool
Drill Pipe Spacer
MCBPV
NMDC
MWD

The latch could be hydraulically configured to operate at depth in response to the pressure drop across the ACC tool before survey. The bypass valve would be closed to enable this feature to be activated. A survey would be possible at this time too, noting of course that the latch would have been scribed to the MWD offset. However this system application requires that we need to isolate the well bore, therefore it is desirable that the latch is mechanical, and is tripped on surface before running in hole. There will not be a bottom to activate the system down hole.

Assuming that the wash, latch and survey operation has been completed satisfactorily, the next phase of the operation is to run the latch and a whipstock with milling assembly pre-configured to suit the coupling orientation. The milling assembly

will have the torque through shear bolt design and horse shoe adapter on the head. The hydraulic retrievable packer will have a lower connection to allow it to interface with the latch sub. Conflict of setting pressure for the packer and tripping pressure for the latch will be manifested at this point. Hydraulically, we need to activate the latch down hole independently of the packer without pre-setting the packer before we are engaged in the latch profile. To eliminate the possibility of a mis-run we should therefore consider that the latch is mechanically activated on surface, and spring biased in the engaged position to allow down hole orientation and engagement. We therefore need to rotate through the latch coupling and reciprocate if we do not have a biased edge to cam the assembly round. Alternatively, we have a biased edge, pass through the coupling and pull back to engage.

To this end, we have a proven shear bolt system as described with the horse shoe above. The latch dog system will be able to cope with frictional contact down hole, and the only other area for concern would be to ensure that drilling solids or other debris lying on the low side of the well bore will not compromise the latch activation.

The proposed bottom hole assembly for this phase of the operation would be:

Orienting Latch Assembly
Hydraulic Retrievable Packstock Assembly
Trackmaster Mill
Running Tool
Drill Pipe Flex Joint
MCBPV
NMDC
MWD

Once the window has been milled, and the lateral drilled, the assembly will be retrieved in the normal fashion, utilising the hook, and a re-entry run established using another whipstock or deflector system. The mill/running tool will be used to confirm exit of the window. The system will be recovered to surface and the subsequent operations will continue in the normal method using the retrievable packstock system.

The proposed hole assembly for this phase of the operation would be:

Orienting Latch Assembly

Whipstock or deflector

Trackmaster Mill

Drill Pipe Flex Joint

NMDC

MWD

System requirements may be refined to drop out equipment as and when confidence of the operation is established.

Subject to the success of the system it is understood consideration will be given to utilising more latch couplings in the wells.

Other points of note for implementation of the system:

The wiper plug necessary for the cementing operation has to be a dual wiper, with sufficient space out between the wipers to ensure the wipers straddle the latch profile and that they get pumped across without pressure loss and subsequent fluid bypass. This is especially important with regard to the latch incorporating the biased edge. If no biased edge is utilised, the need for two wipers is eliminated.

The latch coupling is 7¾" OD with the equivalent casing weight ID, so for 7" 23# = 6.375" ID.

The latch coupling length with biased edge will be about 8ft, and without biased edge, 4ft, note these lengths may vary.

The latch coupling material yield strength will be 80,000psi (L80 equivalent), and connections will be LTC.

Further consideration is necessary with regard to the use of composite casing joints versus steel joints and drilling out using the PDC drill ahead system.

With regard to Figures 11 and 12, both systems are hydraulically activated in principle, however limitations in setting pressures/sequences mean that the latch cannot be activated independently of the packer - when the bypass valve closes, the string pressures up, virtually uncontrollably and both tools would set, the packer setting would prevent us from engaging the latch and in actual fact, the latch with element on its own, would suffer similar problems without some significant sequencing device to ensure the

pack off stayed relaxed until we need it activated.

The need for the element to be actuated (since we do not actually need the anchor/packer slip element) is to isolate the lower leg from losses.

The sequence of operation would therefore be to orient the system with MWD circulating the string through the BPV. Then close the BPV to pressure the string and activate the latch. Engage the latch in the coupling. Check orientation if required, this would need the BPV to be cycled open to circulate for MWD survey, close again and set pack off element. Naturally a second survey is not necessary, and once the latch is engaged, the pack off element can be set.

The following section relates to the latch which engages a profile downhole and which is run in conjunction with a hydraulically set pack-off assembly (see Figures 18 to 22). It is to be noted that the latch system can also be set mechanically as well as hydraulically, though this system description only covers the hydraulic activation of the pack-off assembly. The pack-off assembly you will note has slips and lock ring to retain the whole latch assembly, including the locator in its profile whilst the system is being unset and released for recovery up hole. The latch locator is run and set in its profile in by pulling it back through the profile such that it may cam (orient) itself with a known amount of overpull as the dog is biased by springs, subject to the profile it may have a surface indicator which comprises a bar or gate prior to entry into the profile proper, which gives a preliminary indication of depth location, once in the profile the normal method of confirming location is to set down weight. No movement down with a significant amount of weight is the method of confirming location, to pass through a profile if inadvertently located would require picking up through it, rotating a few degrees to misalign the components and then go down. Usually this is not necessary. Once located in the profile with the nominal overpull, which may be of the order of 20000lbs, (variable), the set down weight would be up to 100000lbs subject to design loads. This allows a whipstock to be located and sheared off in a downward direction, upward will release from the locator, and the window milled accordingly. The system can transmit torsional loads as well. The locator on any of the systems does not incorporate a packer or pack off element, and to protect the well bore from cuttings, and fluid losses to the

formation below, indeed, to protect the latch assembly from debris will require some form of barrier. The barriers to date are usually cup type with fluid bypass areas, through or around which do not totally close off the annular area in the casing. As is consistent with our theme of whipstock technology, we can therefore hydraulically set the pack-off system as described below.

1. Once the latch has engaged and weight set down to ensure proper engagement, the packer can be set by applying pressure. (NPT plug in bottom of mandrel). The piston will move down engage the lock ring housing and shear the top shear screw. The piston will continue to move down and set the element.

2. The second shear screws will then shear, moving the upper cone underneath the slips forcing them out of the cage. The slips will rid up the lower cone and bite into the casing. The packer is now set and will remain so due to the lock ring on the mandrel. Note, the element can be set after the slips are energised.

3. When it is time to retrieve the assembly, pick up and shear the lower screws. This will close the gap between the key and the shoulder on the key slot on the mandrel.

4. Continue to pick up and the lock ring housing will be lifted up which will allow the element to collapse.

5. The shoulder on the mandrel will then contact the internal shoulder in the packer sleeve. This will pull the upper cone from underneath the slips which will now collapse into the cage.

6. The assembly will continue to be picked up until overpull is achieved to snap the latch dog from the profile.

Internal shoulder on the lower cone will allow weight down on the mandrel when running in hole which will stop premature shearing of screws. Also spline between the lower cone and the mandrel throughout the running and retrieving sequence which will maintain orientation.

The mechanical set version (see Figure 13 to 17) can be set as follows:

1. Again the assembly is latched into the profile.

2. Weight is then set down on the top sub which will shear the first set of

screws.

3. The second set will shear releasing the upper cone which will slide underneath the slips, pushing them out of the cage and into the casing.

4. The screws between the lock ring housing and the packer sleeve will shear next and this will then compress the pack-off element. The packer is now set and again remains so due to the lock ring on the mandrel.

5. When it comes to releasing the packer, pick-up and shear out the screws between the mandrel and the lower cone.

6. The top sub, lock ring housing, lock ring and mandrel will be picked up at this stage allowing the element to collapse.

7. The shoulder on the mandrel will then contact the inner shoulder on the packer sleeve. This will pick up the packer sleeve and the upper cone which will move upwards from underneath the slips allowing them to collapse.

8. The shoulder on the upper cone will contact the shoulder on the slip cage and the assembly will move up until the retrieving ring contacts the shoulder on the lower cone.

9. This will now allow to pickup until there is enough force to collapse the dog in the larch to pull the assembly out of the profile.

The mechanical set version performs the same task, but obviously is more sensitive to the loads applied to the locator assembly when passing through couplings (profile subs), and therefore there is a need to stage the shear loads such that the locator engagement is confirmed, the pack-off system is set and finally the milling assembly is sheared off the whipstock to enable a window to be cut, the system including whipstock in both cases may be run independently of the whipstock if so desired.

Notes regarding Figures 7, 8, 9 and 10

FILL INTERNAL VOID AREAS WITH MULTI-PURPOSES GREASE

| ITEM | DESCRIPTION | QTY. |
|---|---|---|
| V | HEX NUT | 5 |
| U | SOC HD CAP SCREW | 5 |
| T | SHEAR SCREW | 4 |
| S | PIPE PLUG | 1 |
| R | SET SCREW | 2 |
| Q | O-RING | 1 |
| P | O-RING | 2 |
| O | O-RING | 2 |
| N | SNAP RING | 1 |
| M | GARTER SPRING | 2 |
| L | O-RING | 4 |
| K | O-RING | 2 |
| J | PACKING ELEMENT | 1 |
| I | SHEAR SCREW, LOWER CONE | 13 |
| H | SET SCREW | 3 |
| G | SPRING SLIP | 4 |
| F | SET SCREW | 2 |
| E | GARTER SPRING | 1 |
| D | SHEAR SCREW, RELEASE | 4 |
| C | O-RING | 2 |
| B | SET SCREW | 3 |
| A | SNAP RING | 1 |

| 24 | NOSE | 1 |
|---|---|---|
| 23 | PISTON CYLINDER | 1 |
| 22 | PISTON | 1 |
| 21 | MANDREL | 1 |
| 20 | RETAINING RING | 1 |
| 19 | LOCKING NUT | 1 |
| 18 | SHIPPING CONTAINER | 1 |
| 17 | LOCKING NUT HOUSING | 1 |
| 16 | PACKER SLEEVE | 1 |
| 15 | MANDREL RETAINING RING | 1 |
| 14 | SPRING LOWER CONE PRELOAD | 1 |
| 13 | LOWER CONE | 1 |
| 12 | SLIP | 4 |
| 11 | SLIP BODY | 1 |
| 10 | SLIP BODY NUT | 1 |
| 9 | UPPER CONE | 1 |
| 8 | RELEASE ADAPTER | 1 |
| 7 | LOCKING COLLET | 1 |
| 6 | RELEASE KEY | 3 |
| 5 | RELEASE ADAPTER CAP | 1 |
| 4 | BY-PASS ROD | 1 |
| 3 | BY-PASS ROD RETAINER | 1 |
| 2 | HEX NUT | 1 |
| 1 | ADAPTER SUB | 1 |
| **ITEM** | **DESCRIPTION** | **QTY.** |

CLAIMS:

1. Downhole apparatus for locating equipment in a required depth and orientation within a well bore, the apparatus comprising a body and a latching member mounted on said body so as to be movable between a retracted position and an extended position, the latching member projecting a greater distance from said body when in the extended position than when in the retracted position, wherein the latching member is adapted to project into a latch profile provided in a casing of a well bore when in the extended position during use and is further adapted to engage with a first portion of said profile in such a way that, when pressed against said profile portion, the latch member tends to slide along a well bore casing edge defining said profile portion so as to locate the latching member centrally in said profile portion before preventing movement of the downhole apparatus in the direction of pressing, the latching member being yet further adapted to engage a second portion of said profile in such a way that, when pressed against said second profile portion, the latching member is moved towards the retracted position so as to permit movement of the downhole apparatus past said latch profile.

2. Downhole apparatus as claimed in claim 1, wherein the apparatus comprises an anchor packer for fixing equipment in the required depth and orientation within the well bore.

3. A method of positioning downhole equipment within a well bore, the method comprising the steps of providing a latch profile in the wall of the well bore or well bore casing; locating a latch member in said latch profile; determining the position and orientation of said latch profile; and making up a spring comprising equipment to be positioned within the well bore, said equipment being fixed relative to a latch member for locating in said latch profile and said equipment being positioned and orientated in view of said determination so as to ensure a desired position and orientation of said equipment is achieved in the well bore when the latch member is located in said latch profile.

Fig.1.

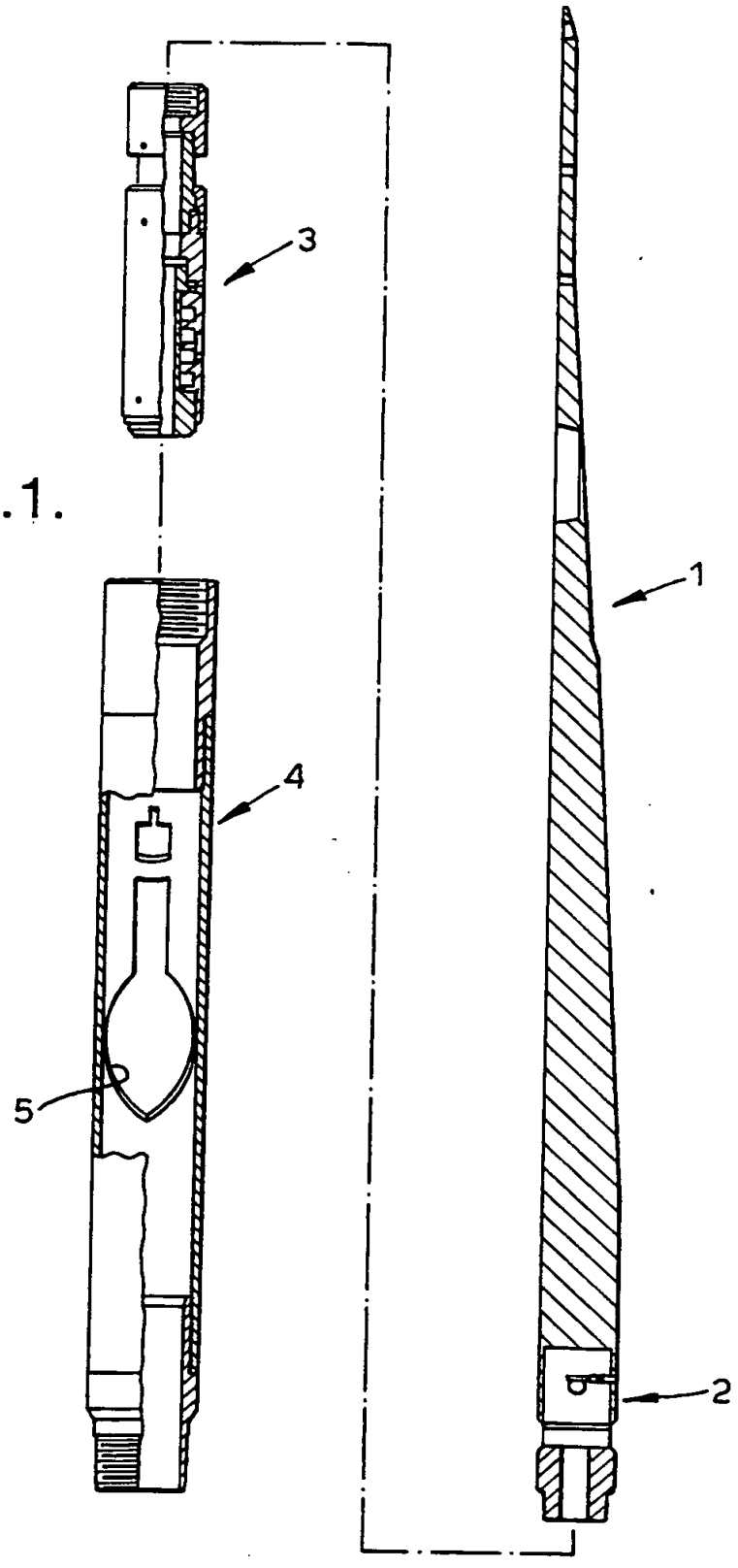


Fig.2.

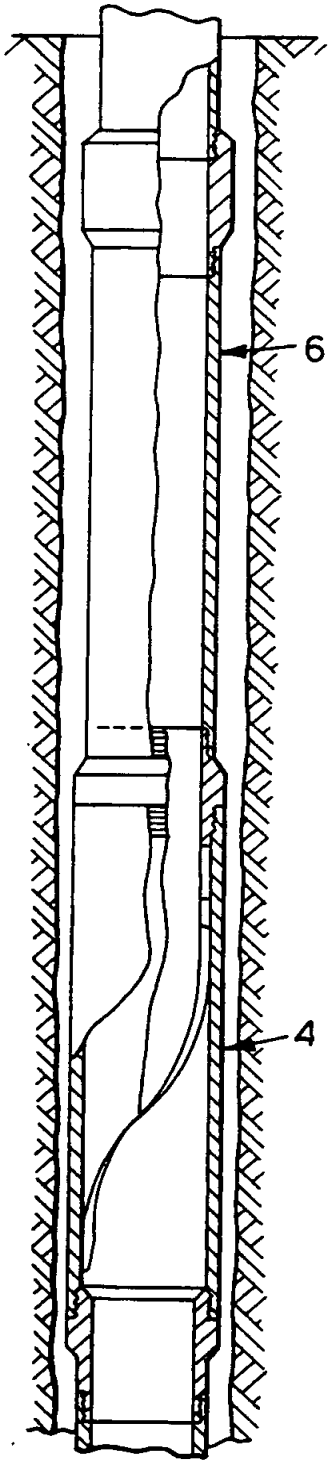



Fig.3.

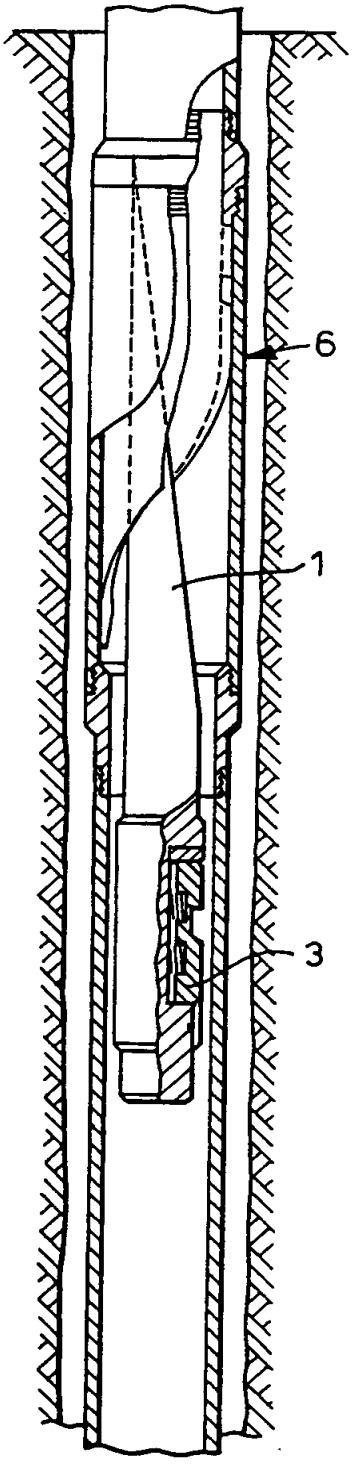



Fig.4.

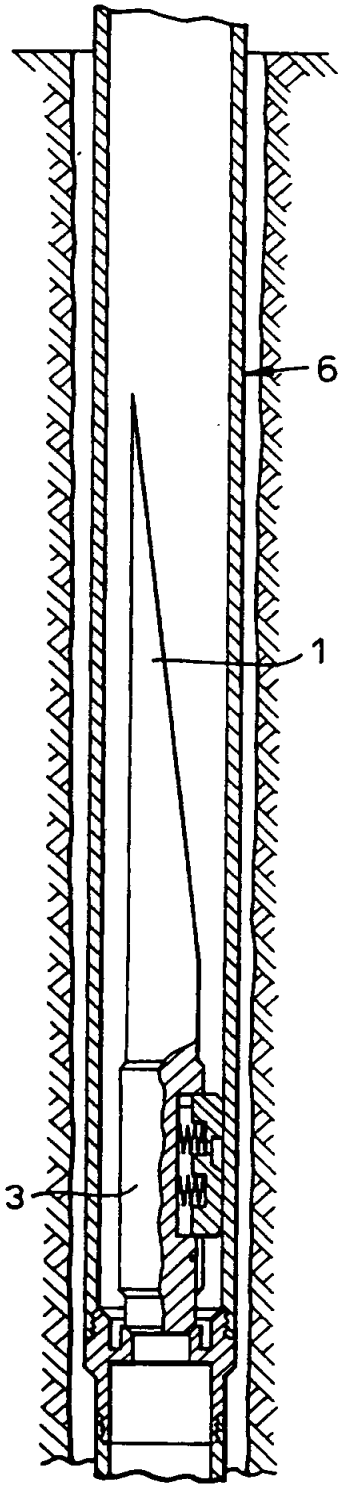


Fig.5.

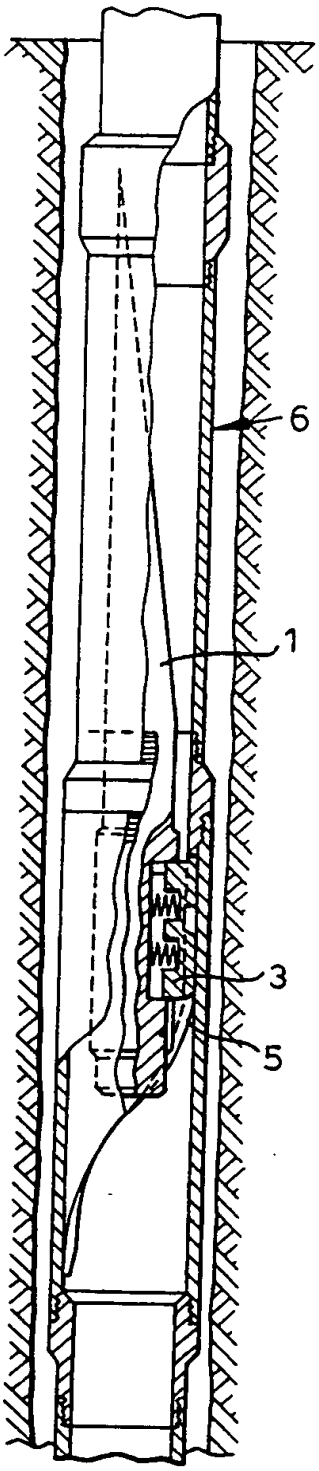



Fig.6.

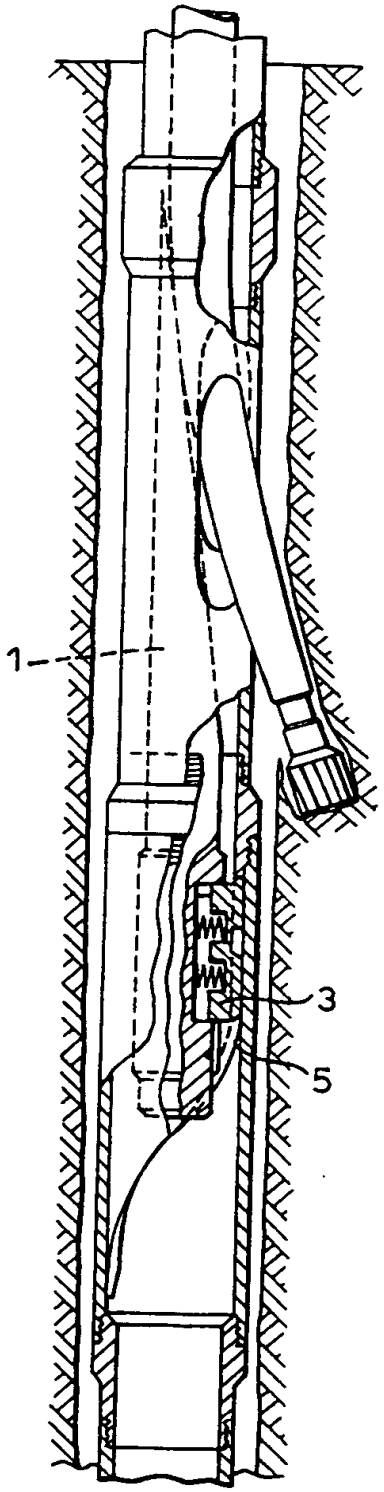


Fig.7.

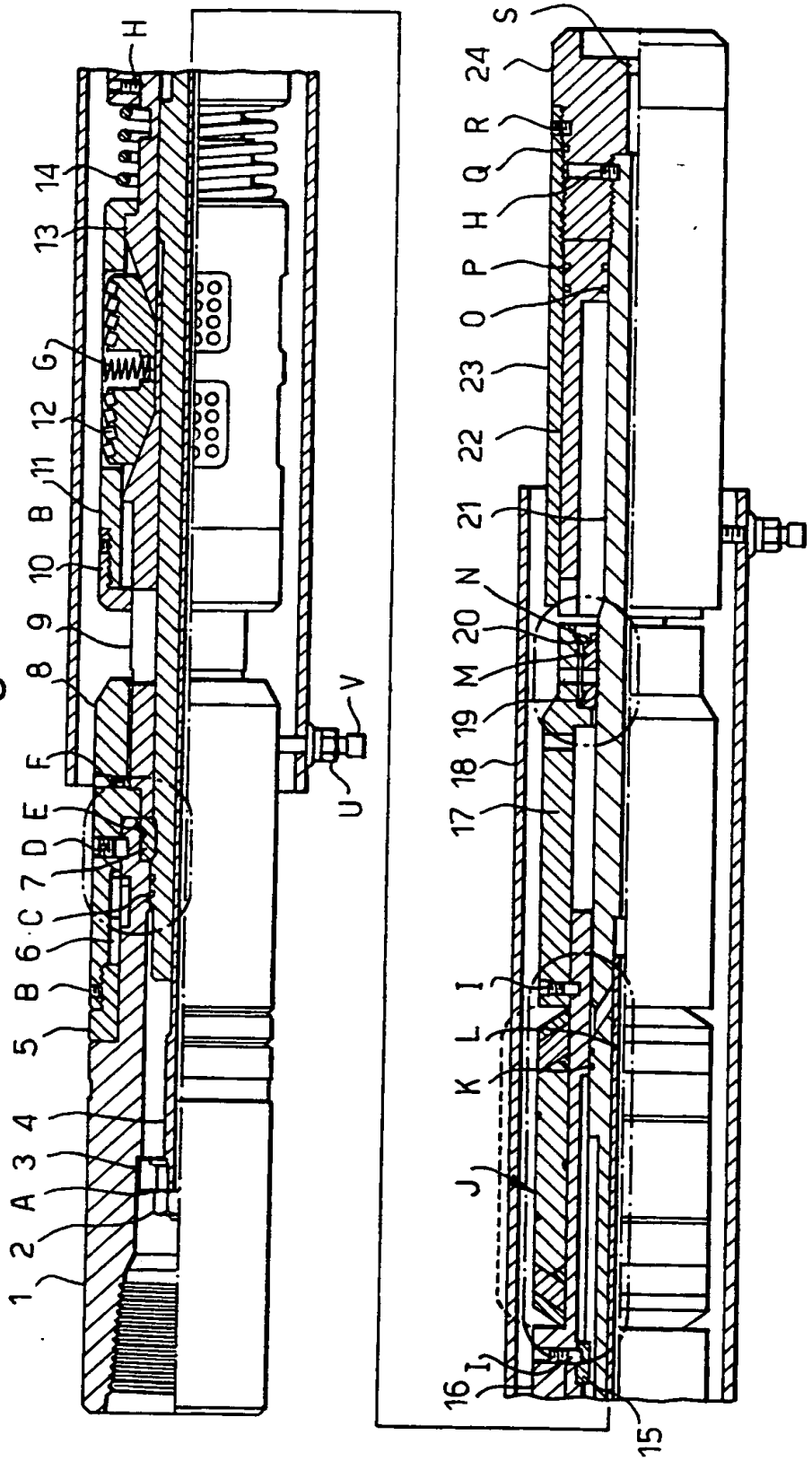

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Fig.8.

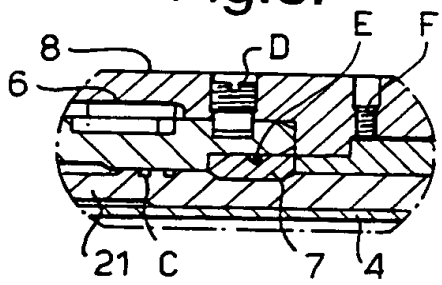



Fig.9.

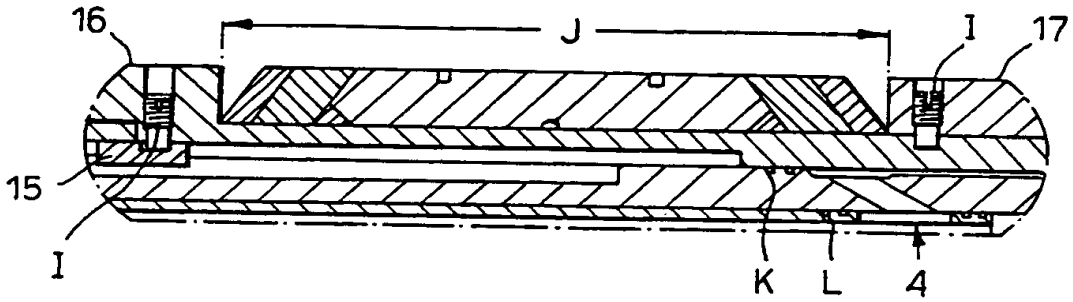



Fig.10.

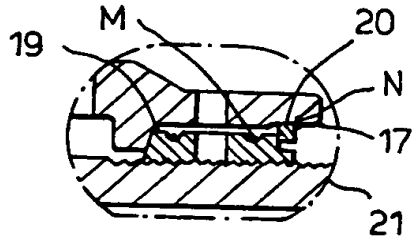


Fig.11.

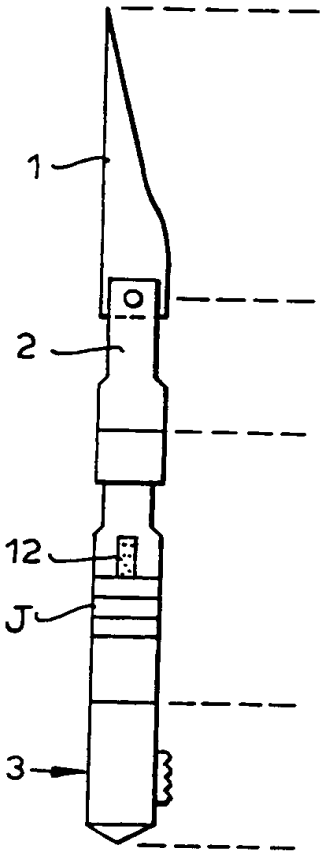
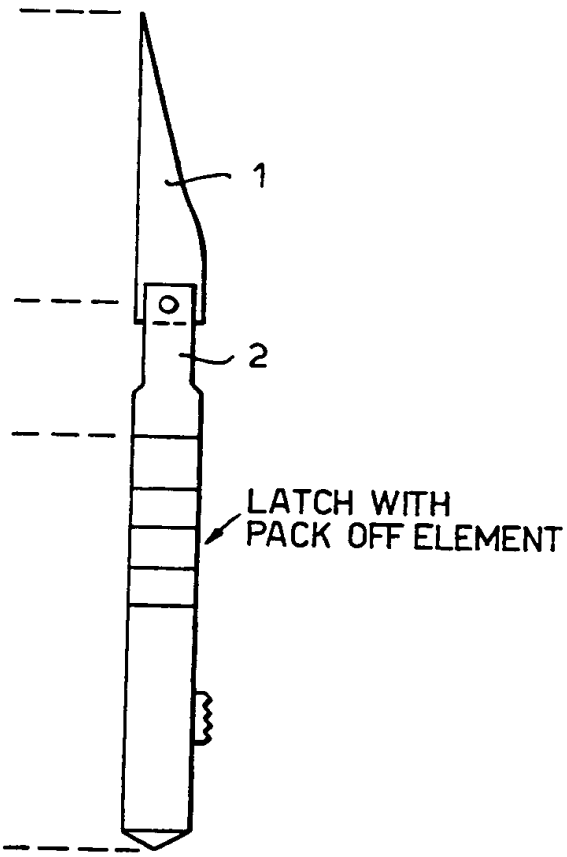



Fig.12.



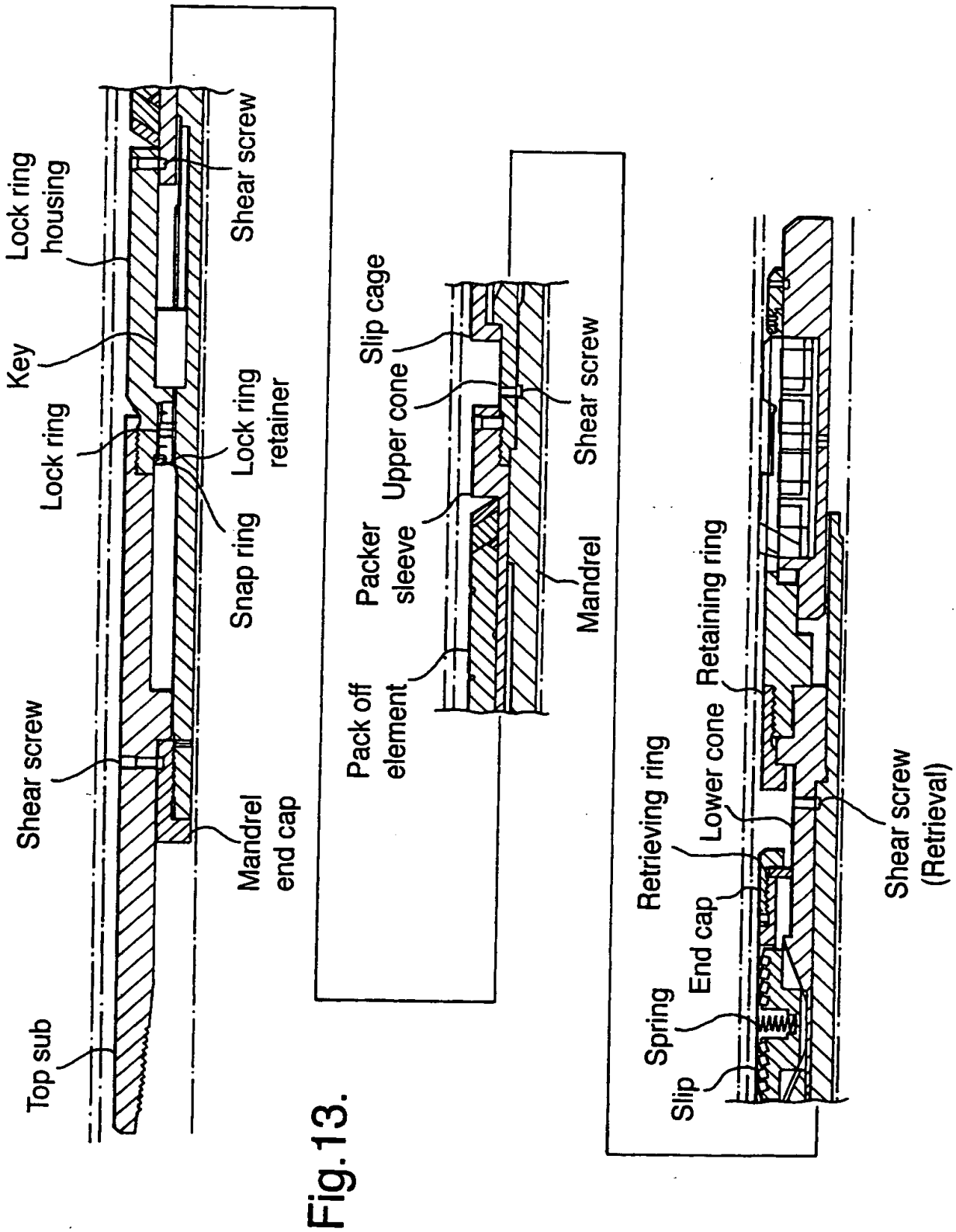

Lock ring housing
Shear screw
Key
Lock ring
Lock ring retainer
Snap ring
Shear screw
Mandrel end cap
Top sub
Slip cage
Upper cone
Shear screw
Packer sleeve
Pack off element
Mandrel
Retaining ring
Lower cone
Retrieving ring
End cap
Spring
Slip
Shear screw (Retrieval)

Fig.13.

Fig.14.

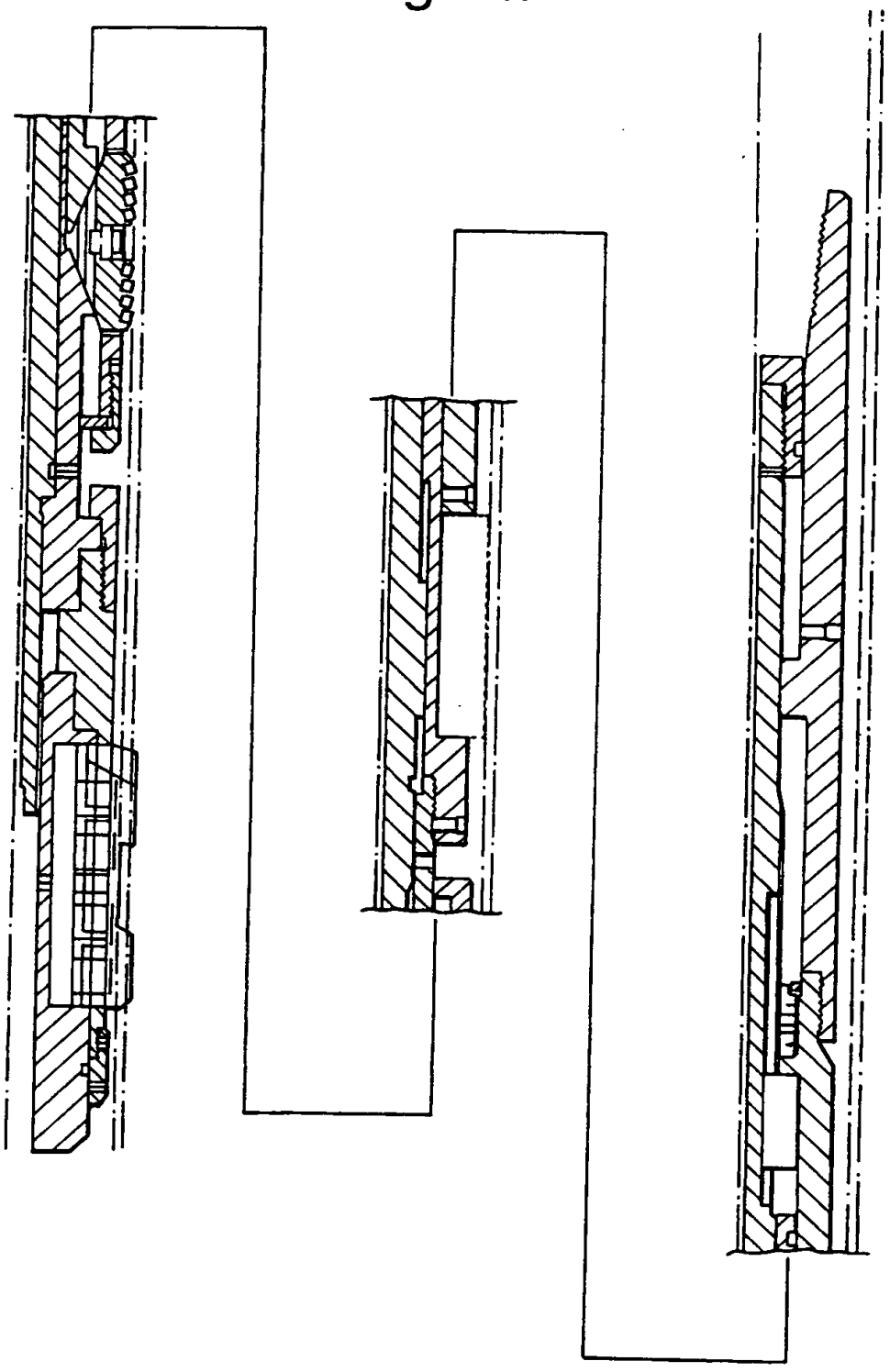


Fig.15.

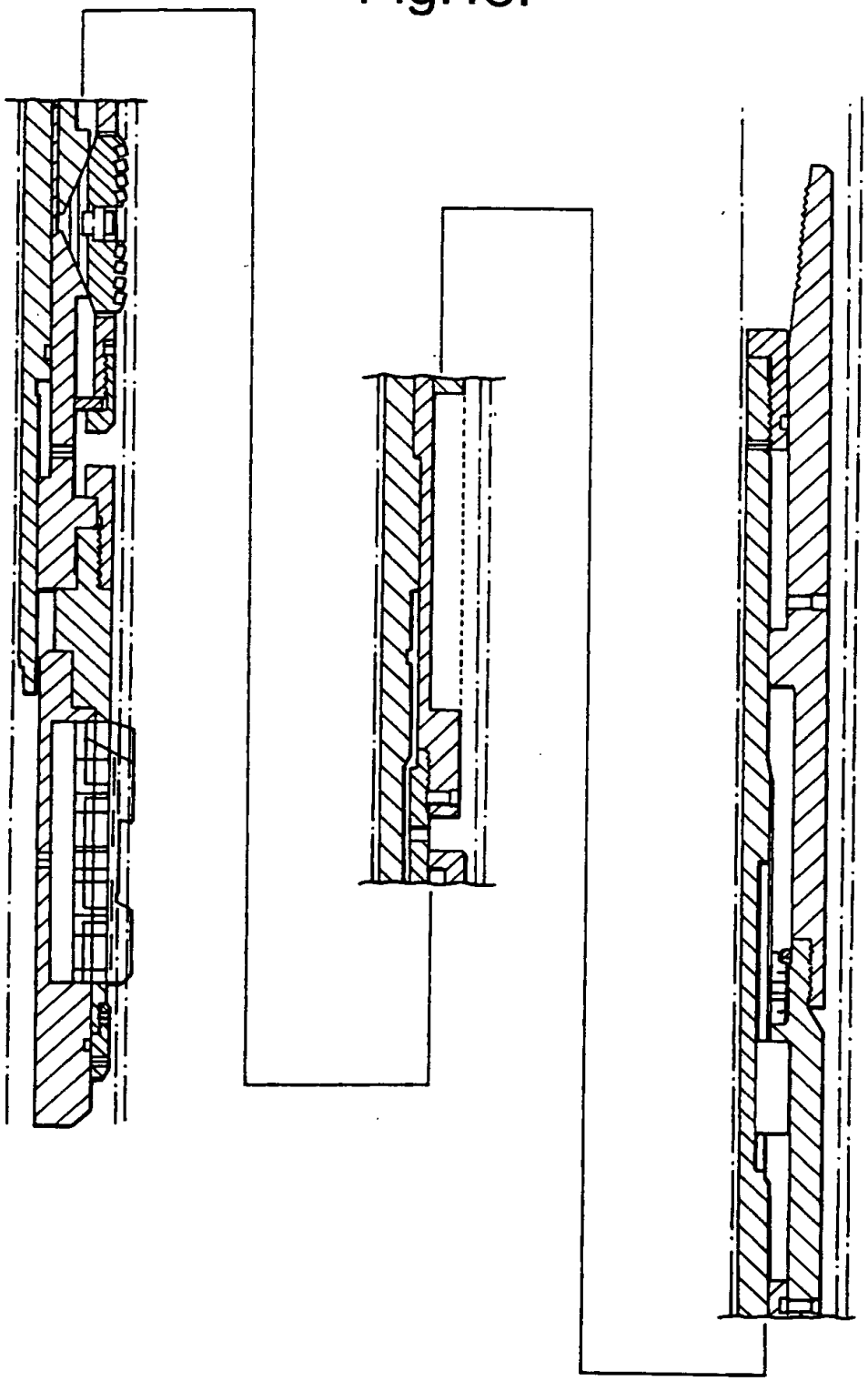


Fig.16.

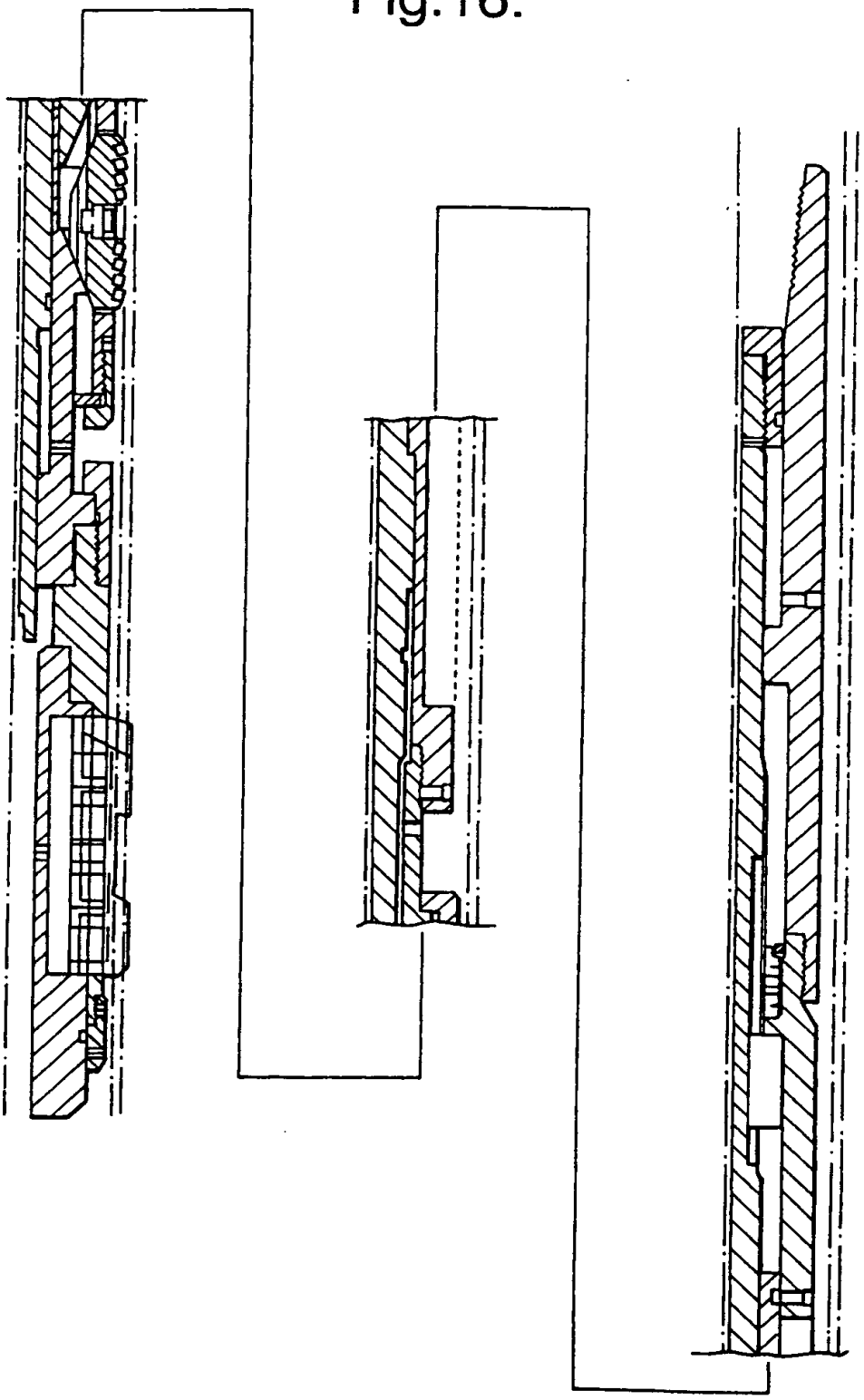
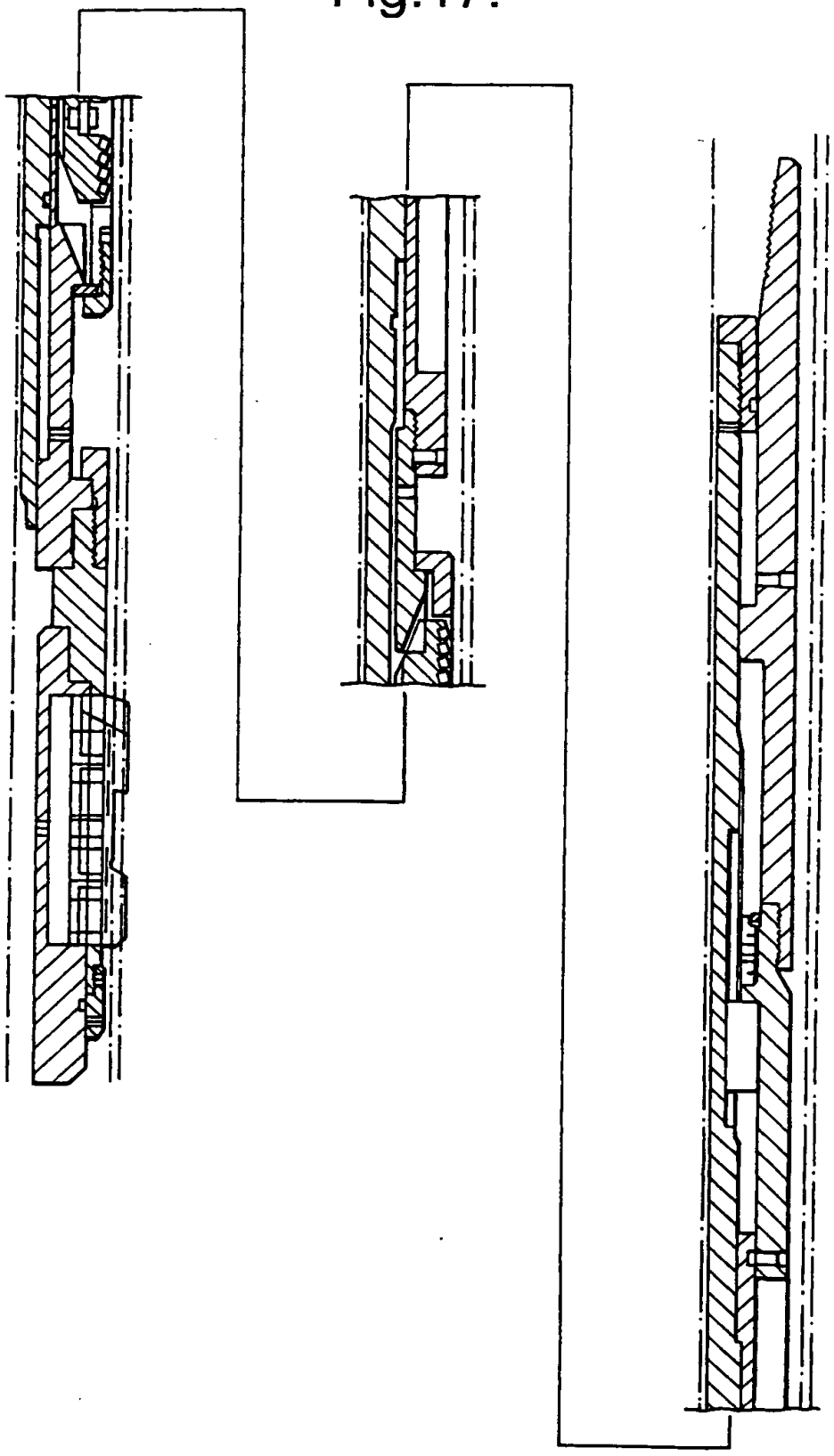


Fig.17.



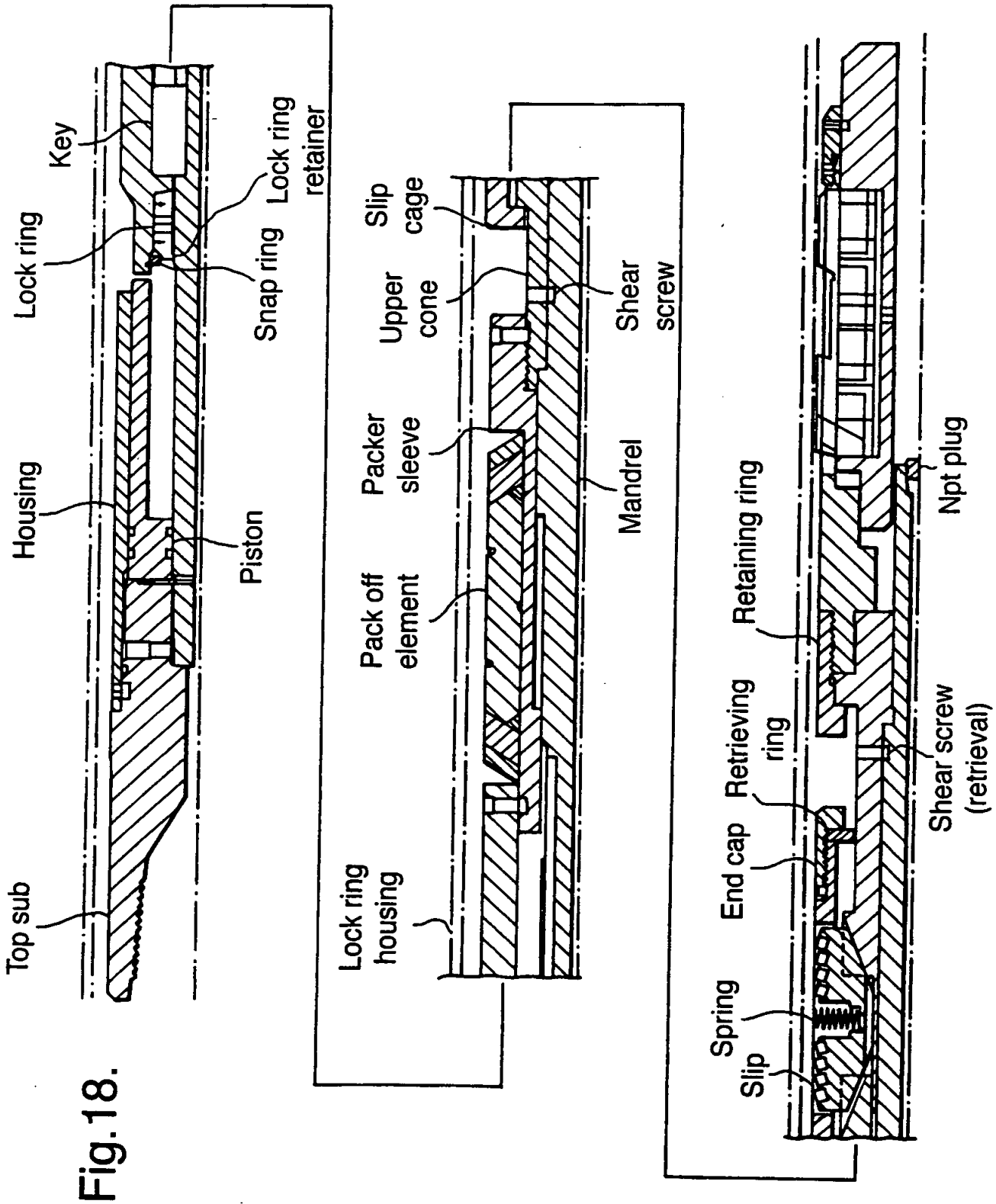

Key
Lock ring
Lock ring retainer
Snap ring
Housing
Piston
Top sub
Slip cage
Upper cone
Shear screw
Packer sleeve
Mandrel
Pack off element
Lock ring housing
Retaining ring
Npt plug
Retrieving ring
End cap
Shear screw (retrieval)
Spring
Slip

Fig.18.

Fig.19.

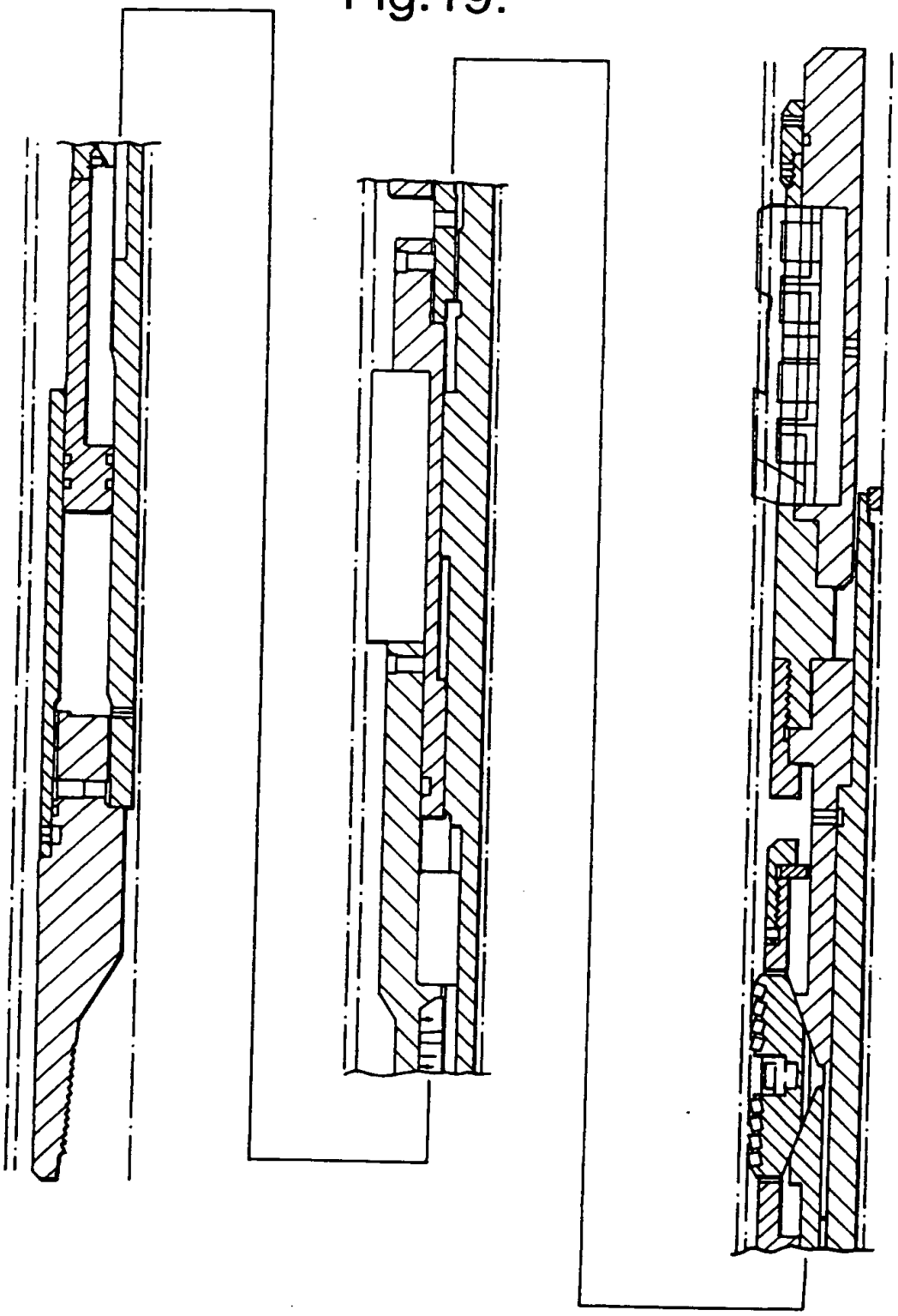


Fig.20.

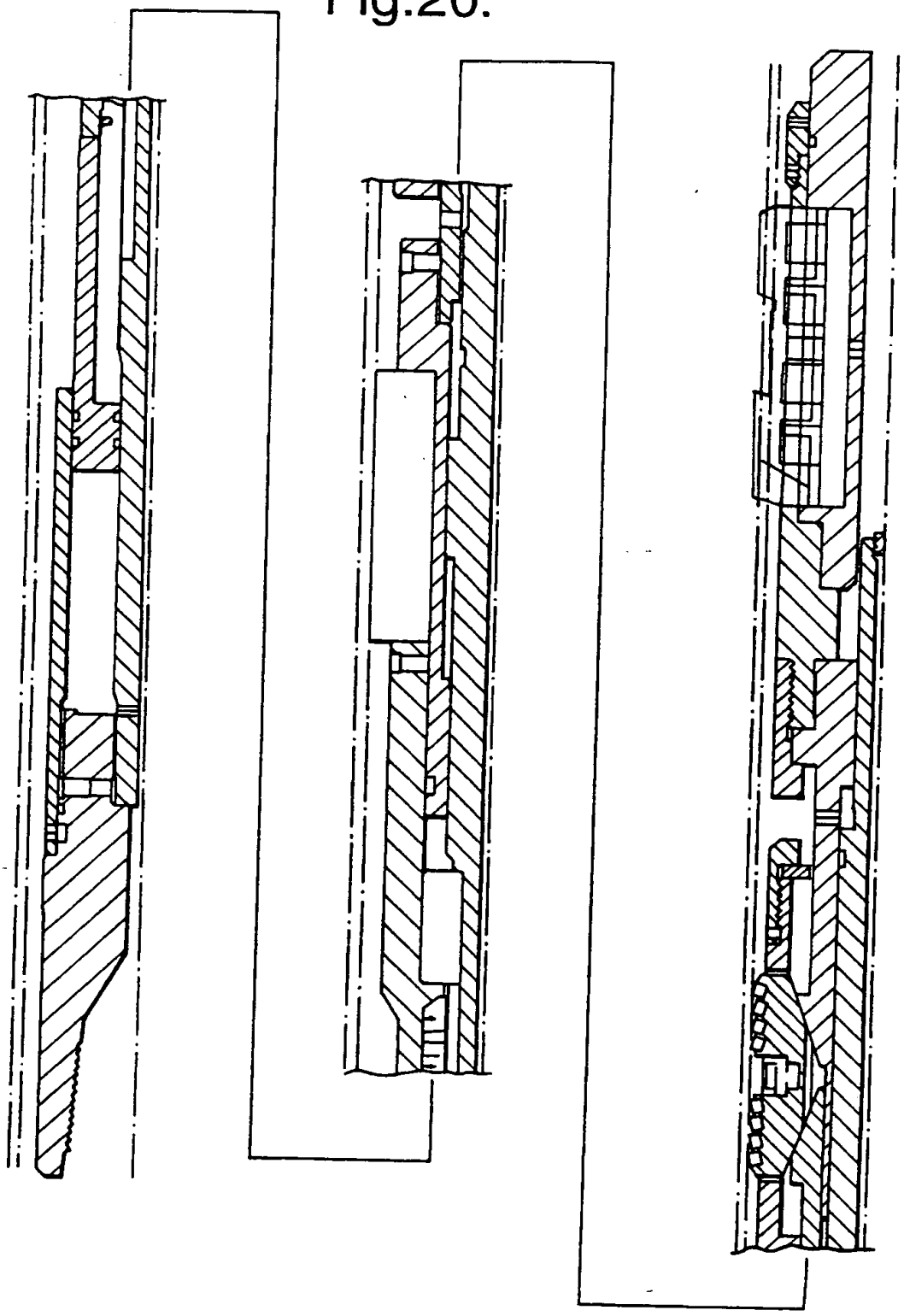


Fig.21.

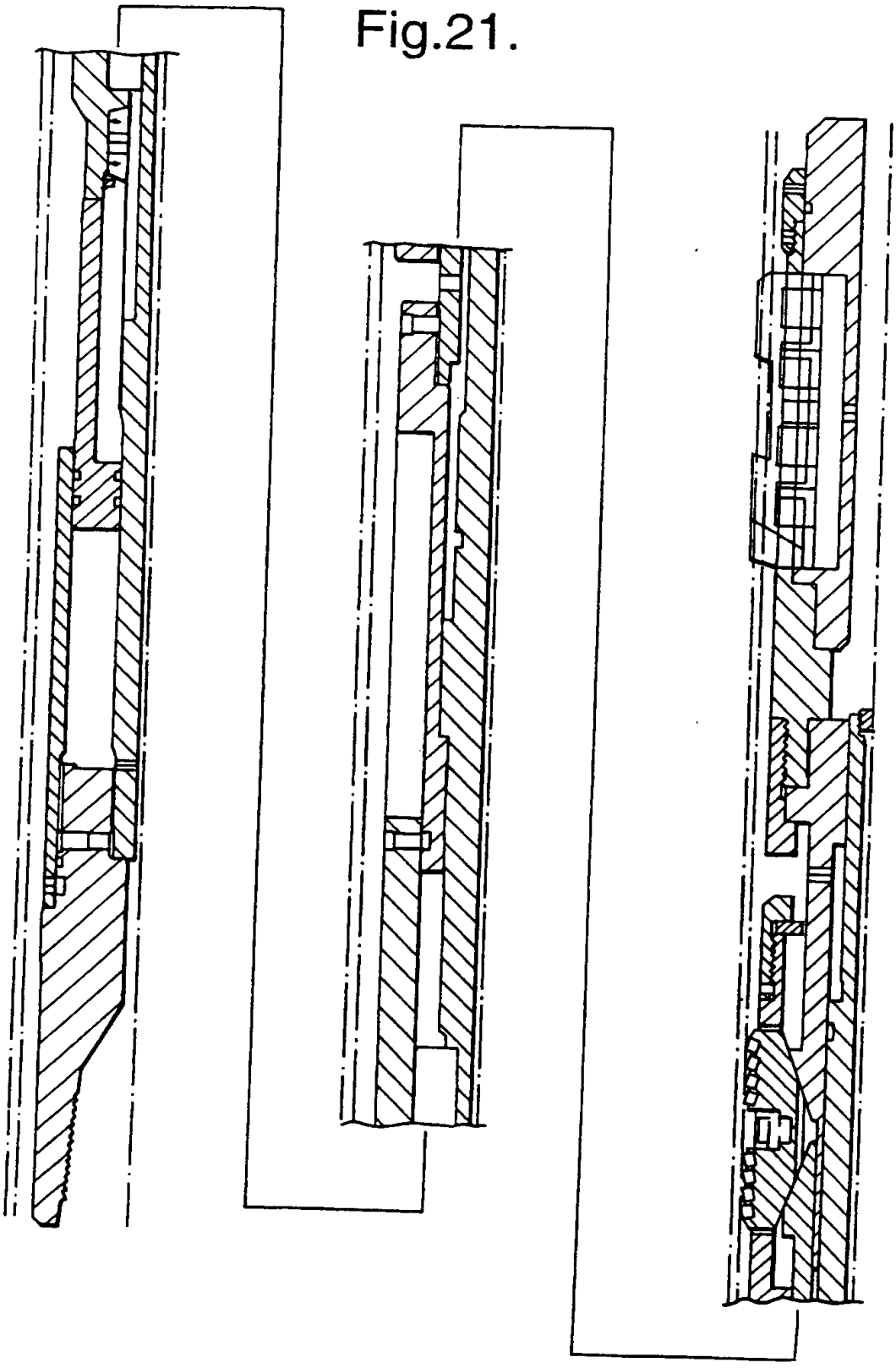
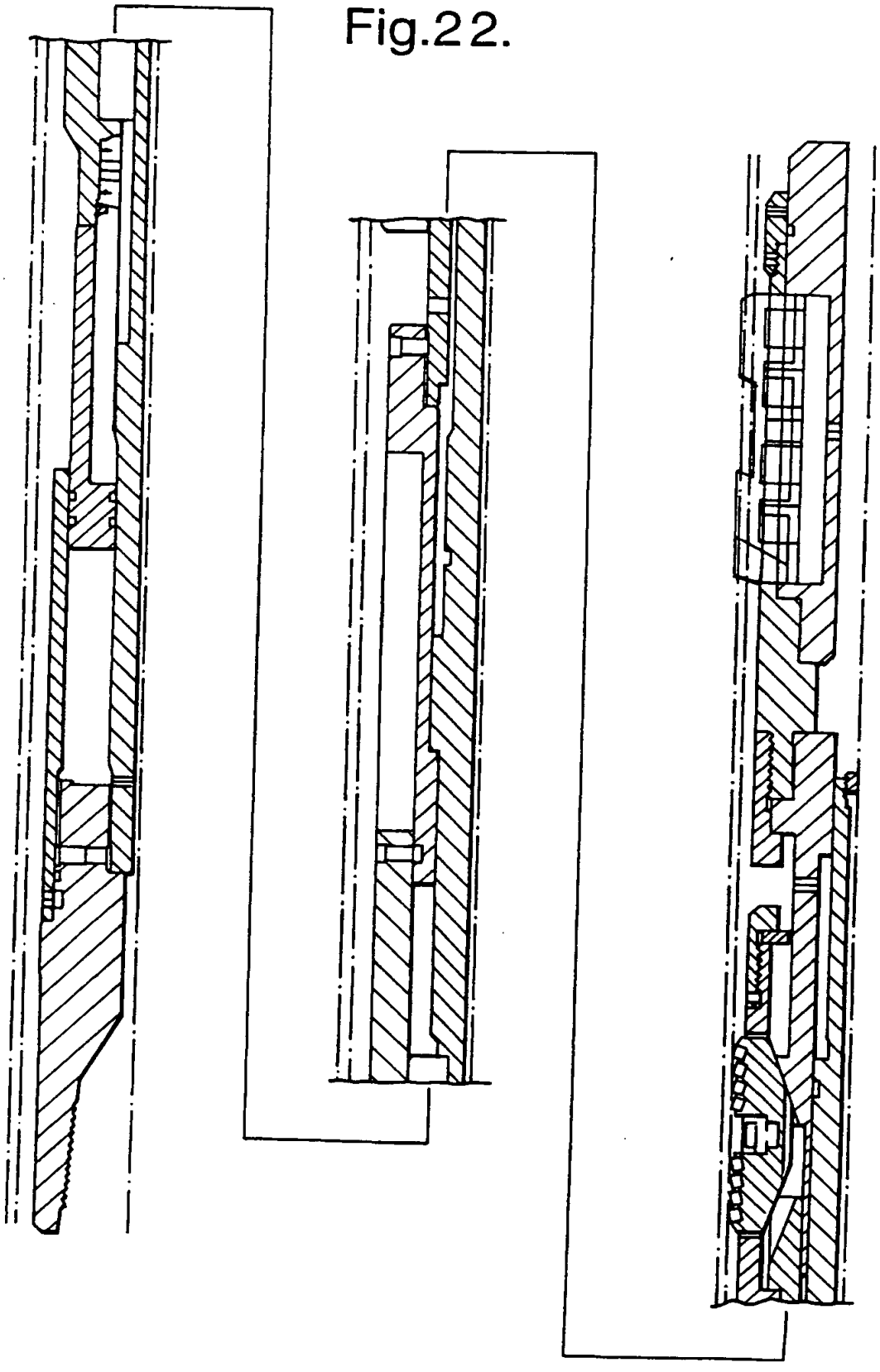


Fig.22.



# INTERNATIONAL SEARCH REPORT

[redacted] nal Application No
PCT/GB 00/03574

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E21B7/06 E21B23/00 E21B23/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 17 January 2001 | 25/01/2001 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Garrido Garcia, M |

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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|---|---|---|
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...ormation on patent family members

nal Application No
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| | | WO 9949178 A | 30-09-1999 |

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# INTERNATIONAL SEARCH REPORT

[redacted] national Application No
[redacted]CT/GB 00/03574

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication,where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| P,A | US 6 089 319 A (SINGLETON TEME F)<br>18 July 2000 (2000-07-18)<br>column 6, line 18 - line 47 | 1-3 |

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[redacted]rnational Application No
PCT/GB 00/03574

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| | | NO 962765 A | 30-12-1996 |
| US 6012516 A | 11-01-2000 | CA 2236047 A | 05-03-1999 |
| US 5704437 A | 06-01-1998 | US 6003621 A | 21-12-1999 |
| US 6089319 A | 18-07-2000 | AU 3044999 A | 18-10-1999 |
| | | WO 9949178 A | 30-09-1999 |